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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,081	06/30/2003	Kye Nam Lee	40296-0024	7874
26633	7590	04/17/2006	EXAMINER	
HELLER EHRMAN WHITE & MCAULIFFE LLP 1717 RHODE ISLAND AVE, NW WASHINGTON, DC 20036-3001			VINH, LAN	
			ART UNIT	PAPER NUMBER
			1765	
DATE MAILED: 04/17/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/608,081

**Applicant(s)**

LEE ET AL.

**Examiner**

Lan Vinh

**Art Unit**

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☒ Certified copies of the priority documents have been received in Application No. 10/608,081.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 3 are rejected under 35 U.S.C. 102(e) as being anticipated by Schwarz (US 6,972,265)

Schwarz discloses a method for fabricating an MTJ stack/ cell comprising the steps of:

forming a metal layer 26 connected to a semiconductor substrate 22 through a lower dielectric/ insulating layer (col 7, lines 30-32 )

sequentially forming a pinned magnetic layer 28, a tunnel barrier layer 32 and free magnetic layer 34 on the metal layer 26 (col 8, lines 30-32; col 9, lines 46-48)

forming a metal layer 36/hard mask layer on the magnetic layer 34 (col 10, lines 44-48; fig. 4)

the hard mask layer 36 and the free magnetic layer 34 are patterned using an etching step and MTJ cell mask 38 as seen in fig. 4, the tunnel barrier layer 32 is exposed after the patterning step (col 11, lines 10-15)

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sequentially forming a barrier layer 42 and insulating layer 50 of silicon oxide <sup>claim 3</sup> on the entire surface (col 12, lines 50-55, col 15, lines 4-6)

anisotropically etching the insulating film to form an insulating spacer on a sidewall of the layer 36/hard mask, magnetic layer 34 and barrier layer 32 (col 15, lines 5-20; fig. 8) etching the tunnel layer 32, the pinned magnetic layer 28 and metal layer 42 using the insulating spacer and the hard mask layer as a mask to define/form MTJ cell and a connection layer (col 13, lines 1-22, fig. 6a)

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarz (US 6,972,265) in view of Parkin et al (US 6,518,588)

Schwarz's method has been described above. Unlike the instant claimed invention as per claim 2, Schwarz fails to disclose forming a Ta barrier layer and an insulating oxide film

Parkin discloses a method for forming a MRAM comprises the steps forming a TaN barrier layer and a insulating oxide film (col 3, lines 34-35, col 6, lines 9-10)

Since both Schwarz and Parkin are directed to method of forming magnetic semiconductor device, one skilled in the art at the time the invention was made would

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have found it obvious to modify Schwarz by forming a barrier layer of Ta in view of Parkins teaching because Parkin discloses that TaN which acts as a thermal diffusion barrier are also useful for magnetic tunnel junction device (col 6, lines 66-67)

### ***Response to Arguments***

5. Applicant's arguments filed 3/22/2006 have been fully considered but they are not persuasive.

In response to the argument that although the Examiner has indicated that claim 3 is rejected, no art has been cited against claim 3, it is noted that the claimed feature of claim 3/an oxide insulating film is taught in the reference of Schwarz as clearly indicated by upper-case letter in line 8 on page 2 of the previous office action

The applicants argue that Schwarz fails to specifically disclose "sequentially forming a barrier layer and an insulating film on the entire surface because as shown in Figs. 5-8 of Schwarz, neither barrier layer/spacer 42 nor barrier layer/spacer 50 is formed over the entire surface of the device. This argument is unpersuasive because while it is true that neither spacer 42 nor spacer 50 is formed over the entire surface of the device as shown in Figs 5, 8, it is also true that Schwarz discloses forming the spacers by depositing the dielectric materials over the semiconductor topography/device and then etching the dielectric materials to form the spacer ( col 12, lines 50-55, col 15, lines 4-6). Thus Schwarz teaching of depositing the dielectric materials 42, 50 over the semiconductor topography/device, before the etching steps to

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form the spacer, certainly reads on the claimed step of "sequentially forming a barrier layer and an insulating film on the entire surface"

The applicants further argue that Schwarz does not disclose "etching the hard mask layer and the free magnetic layer in a photolithography process using a MTJ cell mask to expose the tunnel barrier layer" because in Schwarz the alleged hard mask layer 36 as well as MTJ cell mask 38 are not removed and are present when the barrier layer 42 is formed as shown in Figs. 4-8. This argument is unpersuasive because as disclosed in col 11, lines 10-15 and shown in fig. 4 of Schwarz, the hard mask layer 36 and the free magnetic layer 34 are patterned using an etching step and MTJ cell mask 38 to expose the tunnel barrier layer 32 as required in claim 1

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV  
April 14, 2006